PATENT CLAIMS

1. Method of calculating the concentration of a substance in blood of a mammal

passing the blood through a dialyser comprising a semipermeable membrane and passing a dialysing fluid at the other side of the membrane;

measuring the concentration c_d of said substance in said fluid emitted from said dialyser;

characterised by

introducing a disturbance in said dialyser and calculating the effective dialysance K_e of said dialyser; and

calculating the concentration c_{pw} of said substance in blood.

2. Method according to claim 1, **characterised** by

obtaining the dialysate fluid flow rate Q_d and calculating the concentration of said substance in blood by the formula

$$c_{pw} = c_d \times Q_d / K_e$$

3. Method according to claim 2, **characterised** by

measuring the concentration c_d of said substance in said fluid to obtain a curve over the concentration versus time;

calculating the initial mass m_0 of said substance in the blood;

calculating the initial concentration c_{pw0} of said substance in the body, e.g. by extrapolating to an initiation time;

calculating the distribution volume V of said substance in the body of said mammal according to the formula

$$V = m_0 / c_{pw0}$$

4. Method according to claim 1, 2 or 3, **characterised** by

calculating the effective dialysance K_e of said dialyser by introducing a disturbance in said dialyser in the nature of a change of the concentration of a second substance in said dialysis fluid introduced in the dialyser;

measuring the resulting change in the concentration of said second substance in said dialysis fluid leaving the dialyser for calculating the effective dialysance K_e of said dialyser.

5. Method according to claim 1, 2 or 3, **characterised** by

introducing a known amount of a substance ($m_{urea\ in}$) into the dialysis fluid entering the dialyser;

measuring the concentration (c_d) of said substance in the dialysate emitted from the dialyser;

multiplying the concentration (c_d) with the dialysate flow (Q_d) and integrating the product versus time to obtain an amount ($m_{urea\ out}$) of said substance at the outlet of the dialyser;

calculating the effective dialysance K_e of said dialyser by the formula:

$$D_e = Q_d \times (1 - m_{urea\ out} / m_{urea\ in})$$

where:

D_e = effective dialysance of the dialyser

Q_d = dialysate flow emitted from the dialyser.

6. Method according to claim 4 or 5, **characterised** in that the first substance is urea and the second substance is sodium ions, conductivity or urea.

7. Apparatus for calculating the concentration of a substance in blood of a mammal, comprising:

means for passing the blood through a dialyser comprising a semipermeable membrane and means for passing a dialysing fluid at the other side of the membrane,

means for measuring the concentration c_d of said substance in said fluid emitted from said dialyser,

characterised by

means for introducing a disturbance in said dialyser and for calculating the effective dialysance K_e of said dialyser; and means for calculating the concentration c_{pw} of said substance in blood.

8. Apparatus according to claim 7, **characterised** by means for obtaining the dialysate fluid flow rate Q_d and for calculating the concentration of said substance in blood by the formula

$$c_{pw} = c_d \times Q_d / K_e$$

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9. Apparatus according to claim 8, **characterised** by means for measuring the concentration c_d of said substance in said fluid to obtain a concentration curve;

means for calculating the initial mass m_0 of said substance in the body,

means for calculating the initial concentration c_{pw0} of said substance in the body, e.g. by extrapolating to an initiation time; and

means for calculating the distribution volume V of said substance in the body of said mammal according to the formula

$V = m_0 / c_{pw0}$

10. Apparatus according to claim 7, 8 or 9 **characterised** by

means for calculating the effective dialysance K_e of said dialyser by introducing a disturbance in said dialyser in the nature of a change of the concentration of at least a second substance in said dialysis fluid introduced in the dialyser;

means for measuring the resulting change in the concentration of said second substance in said dialysis fluid leaving the dialyser, and

means for calculating the dialysance of said dialyser.

11. Apparatus according to claim 7, 8 or 9, **characterised** by

means for introducing a known amount of a substance ($m_{urea\ in}$) into the dialysis fluid entering the dialyser;

means for measuring the concentration (c_d) of said substance in the dialysate emitted from the dialyser;

means for multiplying the concentration (c_d) with the dialysate flow (Q_d) and integrating the product versus time to obtain an amount ($m_{urea\ out}$) of said substance at the outlet of the dialyser;

means for calculating the effective dialysance K_e of said dialyser by the formula:

$$D_e = Q_d \times (1 - m_{urea\ out} / m_{urea\ in})$$

where:

D_e = effective dialysance of the dialyser

Q_d = dialysate flow emitted from the dialyser.

12. Apparatus according to claim 10 or 11, **characterised** in that the first substance is urea and the second substance is sodium ions, conductivity or urea.

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